DIN 17671 Part 1 WROUGHT COPPER AND COPPER ALLOY TUBES Properties

1.Field of application

In conjunction with the technical delivery conditions specified in DIN 17671 Part 2, this standard specifies the properties of wrought copper and copper alloy tubes for the dimensional ranges of wall thickness and for outside diameters up to 350mm, as listed in the tables.

The properties of tubes with dimensions outside the dimensional ranges specified shall be agreed at the time of ordering.

Table 1. Copper (composition in accordance with DIN 1787)

Material				Wall thickness mm	Tensile strength Rm N/mm²	0.2%proof stress Rp 0.2 N/mm²	Elongation after fracture A5 % min	Brinell hardness HB
Designation		Number						
SF-Cu		2.0090						
	p		.08	To be agreed.	No strength values specified.			
	zh		.20					
	F20		.10	over 3	200 to 260	max. 110	40	55
	F22		.10	up to 3	220 to 270	max. 140	40	55
	F25		.26	0.5 to 10	250 to 300	min. 150	20	80
	F29		.30	up to 5	min. 290	min. 250	6	95
	F36		.32	up to 3	min. 360	min 320	-	110

Table 2. Copper-zinc alloys without further alloying elements (Brass) (composition in accordance with DIN 17660)

Material		Wall thickness mm	Tensile strength Rm N/mm²	0.2%proof stress Rp 0.2 N/mm²	Elongation after fracture A5 % min	Brinell hardness HB
Designation	Number 1)					
CuZn5	2.0220					

	P		.08	To be agreed.	No strength values specified.			
	F22		.10	up to 10	220 to 260	max.130	40	60
	F26		.26	up to 10	260 to 320	min. 190	19	85
	F32		.30	up to 5	min. 320	min. 260	8	110
CuZn15		2.0240						
	P		.08	To be agreed.	No strength values specified.			
	F26		.10	up to 10	260 to 310	max.150	45	65
	F31		.26	up to 10	310 to 370	min. 200	23	95
	F37		.30	up to 5	min. 370	min. 290	11	120
CuZn20		2.0250						
	P		.08	To be agreed.	No strength values specified.			
	F27		.10	up to 10	270 to 320	max.160	47	65
	F32		.26	up to 10	320 to 390	min. 200	25	100
	F39		.30	up to 5	min. 390	min. 300	13	25
CuZn30		2.0265						
	P		.08	To be agreed.	No strength values specified.			
	F28		.10	up to 10	280 to 350	max.180	50	70
	F35		.26	up to 10	250 to 420	min. 200	28	110
	F42		.30	up to 5	min. 420	min. 320	13	130
CuZn36 CuZn37		2.0335 2.0321						
	P		.08	To be agreed.	No strength values specified.			
	zh		.20					
	F29		.10	up to 10	290 to 370	max.180	50	70
	F37		.26	up to 10	370 to 440	min. 200	27	110

	F44		.30	up to 5	440 to 540	min. 340	12	135
	F54		.32	up to 2	370 to 440	min. 470	6	160
CuZn40		2.0360						
	P		.08	To be agreed.	No strength values specified.			
	F34		.10	up to 10	min. 340	max.220	35	80
	F41		.26	up to 10	min. 410	min. 220	20	115
	F47		.30	up to 5	min. 470	min. 350	11	140
1) The appended numbers.26, 30 and 32 do not apply for the non-stress relieved condition. No values have been specified for strain-hardened stress relieved conditions.								

Table 3. Leaded copper-zinc alloys (composition in accordance with DIN 17660)

Table 4. Copper-zinc alloys with further alloying elements (special brass) (composition in accordance with DIN 17660)

Material				Wall thickness mm	Tensile strength Rm N/mm²	0.2%proof stress Rp 0.2 N/mm²	Elongation after fracture A5 % min	Brinell hardness HB
Designation		Number						
CuZn20 Al2		2.0460						
	P		.08	To be agreed.	No strength values specified.			
	F22		.10	up to 10	330	120	35	85
CuZn23Al6Mn4Fe3	F78	2.0500.88		up to 20	780	540	8	190
CuZn31Si 1 (CuZn31Si)		2.0490						
	P		.08	To be agreed.	No strength values specified.			
	F44		.27	1 to 8	440	200	30	120
	F49		.31	1 to 8	490	290	15	160
CuZn35Ni2 (CuZn35Ni)		2.0540						

	P		.08	To be agreed.	No strength values specified.			
	F49		.27	3 to12	490	290	18	130
	F54		.31	3 to 8	540	390	14	150
CuZn40 Al1		2.0561						
	P		.08	To be agreed.	No strength values specified.			
	F39		.09	3 to12	390	150	25	110
	F44		.27	3 to 8	440	200	20	120
	F59		.31	3 to 8	490	260	15	140
CuZn40 Al2		2.0550						
	P		.08	To be agreed.	No strength values specified.			
	F44		.27	4 to 12	540	230	15	150
	F49		.31	4 to10	590	250	10	160
CuZn40Mn (CuZn40Mn)		2.0572						
	P		.08	To be agreed.	No strength values specified.			
	F44		.27	3 to12	440	180	20	125
	F49		.31	3 to 8	490	270	18	140
CuZn40Mn 1Pb (CuZn40MnPb)		2.0580						
	P		.08	To be agreed.	No strength values specified.			
	F39		.09	3 to12	390	150	22	110
	F44		.27	3 to 8	440	180	18	125
	F49		.31	2 to 5	490	290	15	140
1) Some designations have been amended in accordance with DIN 17660. The previous designations are given in brackets for the purposes of information.								

Table 5. Copper-tin alloys (tin bronze) (composition in accordance with DIN 17662)

Material				Wall thickness mm	Tensile strength *R*m N/mm²	0.2%proof stress Rp 0.2 N/mm²	Elongation after fracture A5 % min	Brinell hardness HB
Designation		Number						
CuSn6		2.1020						
	P		.08	To be agreed.	No strength values specified.			
	F34		.10	up to 5	340 to 400	max.260	55	85
	F40		.26	up to 5	400 to 490	min. 220	30	135
	F49		.30	up to 2	490 to 610	min. 390	12	155
	F61		.32	up to 2	min. 610	min. 510	7	185
CuSn8		2.1030						
	P		.08	To be agreed.	No strength values specified.			
	F34		.10	up to 5	390 to 450	max.290	60	90
	F40		.26	up to 5	450 to 540	min. 250	28	145
	F46		.30	up to 2	min. 540	min. 460	10	170

Table 6. Copper-nickel-zinc alloys (nickel siver) (composition in accordance with DIN 17663)

Material				Wall thickness mm	Tensile strength *R*m N/mm²	0.2%proof stress Rp 0.2 N/mm²	Elongation after fracture A5 % min	Brinell hardness HB
Designation		Number						
CuNi12Zn20		2.1020						
	P		.08	To be agreed.	No strength values specified.			
	F34		.10	up to 3	340 to 420	max.290	45	85
	F42		.26	up to 3	420 to 490	min. 240	28	125
	F49		.30	up to 2	min. 490	min. 390	12	150
CuNi18Zn20		2.1030						
	P		.08	To be agreed.	No strength values specified.			
	F37		.10	up to 3	370 to 440	max.290	40	95

	F44		.26	up to 3	440 to 540	min. 290	20	135
	F54		.30	up to 2	min. 540	min. 470	6	150

Table 7. Copper-nickel alloys (composition in accordance with DIN 17 664)

Material			Wall thickness mm	Tensile strength Rm N/mm²	0.2%proof stress Rp 0.2 N/mm²	Elongation after fracture A5 % min	Brinell hardness HB
Designation *)		Number					
CuNi10Fe1Mn (CuNi10Fe)		2.0872					
	P		.08	To be agreed.	No strength values specified.		
	F34		.10	up to 5	min. 290	min. 90	30	80
CuNi30Mn1Fe (CuNi30Fe)		2.0882					
	P		.08	To be agreed.	No strength values specified.		
	F36		.10	up to 5	360 to 490	min. 120	30	100
*) Some designations have been amended in accordance with DIN 17 664. The previous designations are given in brackets for the purposes of information.								

Table 8. Copper-aluminum alloys (aluminum bronze) (composition in accordance with DIN 17665)

Material			Wall thickness mm	Tensile strength Rm N/mm²	0.2%proof stress Rp 0.2 N/mm² min	Elongation after fracture A5 % min	Brinell hardness HB
Designation *)		Number 1)					
CuAl8		2.0920					
	P		.08	To be agreed.	No strength values specified.		
	F37		.10	2 to10	370 to 450	130	35	90
	F49		.30	2 to 8	min. 490	270	15	130

CuAl8Fe (CuAl8Fe)		2.0932						
	P		.08	To be agreed.	No strength values specified.			
	F39		.10	4 to12	390 to 490	150	30	110
	F54		.30	4 to 8	min. 540	270	12	145
CuAl10FeMn2 (CuAl10Fe)		2.0936						
	P		.08	To be agreed.	No strength values specified.			
	F64		.98	4 to 8	min. 640	290	10	165
CuAl9Mn2 (CuAl9Mn)		2.0960						
	P		.08	To be agreed.	No strength values specified.			
	F44		.27	3 to12	440	180	20	125
	F49		.31	3 to 8	490	270	18	140
CuZn40Mn 1Pb (CuZn40MnPb)		2.0580						
	P		.08	To be agreed.	No strength values specified.			
	F64		.97	4 to 12	min. 640	340	10	180
CuAl11Ni6Fe5 (CuAl11Ni)		2.0978						
	P		.08	To be agreed.	No strength values specified.			
	F69		.97	2 to 5	490	290	15	140

*) Some designations have been amended in accordance with DIN 17665. The previous designations are given in brackets for the purposes of information.

1) The appended number. 30 does not apply for the non-stress relived condition. If, subject to a particular agreement, the tubes are to be supplied in the stress relived in the stress relieved condition, the appended number is to be changed into 3.1.